

A NEW SECTION IN THE GOLDFIELD GENUS *LASTHENIA* (COMPOSITAE:
HELIANTHEAE SENSU LATO)

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ABSTRACT

Lasthenia Cass. sect. *Ornduffia* R. Chan is a new section in the goldfield genus *Lasthenia* (Compositae: Heliantheae sensu lato).

The goldfield genus *Lasthenia* Cass. (*sensu* Ornduff 1966, 1971, 1993) comprises 20 species and subspecies in six sections. Five of Ornduff's (1966) six sectional circumscriptions are monophyletic based on results from a recent molecular phylogenetic study using nuclear and chloroplast DNA sequences (Chan 2000, Chan et al. in press): *L. sect. Baeria* (Fisch. & Mey.) Ornduff, *L. sect. Burrielia* (DC.) Ornduff, *L. sect. Hologymne* (Bartling) A. Gray in Torr. and A. Gray, *L. sect. Lasthenia*, and *L. sect. Platycarpha* (Hall) Ornduff. Based on the same data, *L. sect. Ptilomeris* (Nutt.) Ornduff (*sensu* Ornduff 1966), which comprises six species [*L. burkei* (Greene) Greene, *L. conjugens* Greene, *L. coronaria* (Nutt.) Ornduff, *L. fremontii* (Torr. ex A. Gray) Greene, *L. maritima* (A. Gray) M. Vasey, and *L. minor* (DC.) Ornduff], is strongly resolved as two well-supported monophyletic groups. *Lasthenia burkei*, *L. conjugens*, and *L. fremontii* form an unresolved monophyletic lineage; *L. coronaria*, *L. maritima*, and *L. minor* form another monophyletic group. The relationship between these two groups of species is unresolved. Disparity among these species in chromosome numbers, flavonoid chemistry (Bohm et al. 1974; Ornduff et al. 1974), and morphological features further challenge the monophyly of *L. sect. Ptilomeris*. A review of all available data support the separation of *L. sect. Ptilomeris* into two monophyletic sections.

The two groups of species can be distinguished by fruit sizes, chromosome numbers, habitat preferences, and, to some extent, by geographic distribution. *Lasthenia burkei*, *L. conjugens*, and *L. fremontii* have cypselae that are less than 1.5 mm long, have chromosome numbers of $2n = 12$, and are commonly associated with vernal pools. They have distributions mostly limited to interior California. Both *L. burkei* and *L. conjugens* are listed as endangered species in the federal list of endangered and threatened wildlife and plants (Tibor 2001). *Lasthenia coronaria*, *L. maritima*, and *L. minor* have cypselae more than 1.5 mm long, have chromosome numbers of $2n = 8$ or 10 , and are not usually associated with vernal pools although *L. minor* has been found in vernal pools (D. Keil pers.

comm.). They have wide distributions that include coastal habitats in California (and, for *L. coronaria* and *L. maritima*, elsewhere along the Pacific coast of North America).

Based on phylogenetic results, I propose that the members of *L. sect. Ptilomeris sensu* Ornduff (1966, 1993) be relegated to two sections: *L. sect. Ptilomeris sensu stricto* with *L. coronaria*, *L. maritima*, and *L. minor* and *L. sect. Ornduffia* with *L. burkei*, *L. conjugens*, and *L. fremontii*.

Lasthenia Cass. sect. *Ptilomeris* (Nutt.) Ornduff, emend. R. Chan

Plants not associated with vernal pools, leaves entire, irregularly lobed, or pinnatifid, involucre hemispheric to obconic, phyllaries free, receptacles conic, corollas of disc florets 5-lobed, floral pigments remaining yellow in dilute alkali, tips of anthers ovate to obovate, cypselae greater than 1.5 mm long, pappose or epappose, scales of pappi erose, lance-aristate, and/or subulate-aristate, $2n = 8, 10$.

A new section is erected for *L. burkei*, *L. conjugens*, and *L. fremontii*, and is named for Professor Emeritus Robert Ornduff, in recognition of his outstanding contributions to the understanding of the evolution of *Lasthenia* and other groups in the California flora.

Lasthenia Cass. sect. *Ornduffia* R. Chan, *sect. nov.*

Type species: *Dichaeta fremontii* Torr. ex A. Gray \equiv *Lasthenia fremontii* (Torr. and A. Gray) Greene

Plantae in consortio lacunarum vernalium et foliis plerumque pinnatifidis, involucri hemisphaericis vel obconicis, phyllariis libris (ex parte connatis in una specie), receptaculis conicis vel tholiformibus, corollis flosculorum discorum 5-lobatis, pigmentis floralibus remanentibus flavis in solutionibus dilutis alcalinis, apicibus antherarum linearibus vel anguste ovatis, cypselis <1.5 mm longis, papposis vel epapposis, squamellis papparum erosis vel subulatis-aristatis, $2n = 12$.

Plants associated with vernal pools, leaves usually pinnatifid, involucre hemispheric or obconic, phyllaries free (partly fused in *L. conjugens*), receptacles conic or dome-shaped, corollas of disc florets 5-lobed, floral pigments remaining yellow in dilute alkali solution, tips of anthers linear to narrowly ovate, cypselae less than 1.5 mm long, pappose or epappose, scales of the pappi erose or subulate-aristate, $2n = 12$.

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LITERATURE CITED

- BOHM, B. A., N. A. M. SALEH, AND R. ORNDUFF. 1974. The flavonoids of *Lasthenia* (Compositae). *American Journal of Botany* 61:551-561.
- CHAN, R., B. G. BALDWIN, AND R. ORNDUFF. Goldfields revisited: A molecular phylogenetic perspective on the evolution of *Lasthenia* (Compositae: Heliantheae sensu lato). *International Journal of Plant Sciences* (In press).
- CHAN, R. K.-G. 2000. Molecular systematics of the goldfield genus *Lasthenia* (Compositae: Heliantheae sensu lato). Ph.D. dissertation. University of California, Berkeley.
- ORNDUFF, R. 1966. A biosystematic survey of the goldfield genus *Lasthenia* (Compositae: Helenieae). University of California Publications in Botany 40:1-92.
- . 1971. A new tetraploid subspecies of *Lasthenia* (Compositae) from Oregon. *Madroño* 21(2):96-98.
- . 1993. *Lasthenia* Pp. 298-299. In *The Jepson manual: Higher plants of California*, J. C. Hickman (ed.). University of California Press, Berkeley, CA.
- , B. A. BOHM, AND N. A. M. SALEH. 1974. Flavonoid races in *Lasthenia* (Compositae). *Brittonia* 26: 411-420.
- TIBOR, D. (ed.). 2001. Inventory of rare and endangered vascular plants of California. California Native Plant Society Special Publication No. 1, 6th ed. California Native Plant Society, Sacramento, CA.